AMERICAN

RAILROAD JOURNAL,

AND

MECHANICS' MAGAZINE.

No. 2, Vol. II. New Series.] JANUARY 15, 1839. [Whole No. 326. Vol. VIII.

Power of Traction of Locomotive Engines.

To the Editors of the Railroad Journal and Mechanics' Magazine—

GENTLEMEN,—It is not without a due sense of the ungentlemanly character of Mr. Detmold's last communication, in reply to mine, that he is again noticed. A regard for truth, and for whatever may serve to advance the profession of which I am a member, have prompted me to waive all considerations of a personal nature in my present determination to again trouble the readers of your Journal with an exposition of the errors which Mr. Detmold has committed, and of the misrepresentations, of which I shall presently show he has been guilty.

In my letter of April 7, to which Mr. Detmold has thought proper again to allude, I held the following language. "As to the accuracy of De Pambour's formula, *within* the limits in which it may be considered properly applicable, although I believed it to be nearer the truth than appears on a more critical examination, yet I gave it as my opinion that it was imperfect." Mr. Detmold asserts, that one of the imperfections above alluded to "consists, according to Mr. Johnson, in the fact that the formula in question 'does not designate the point at which it ceases to be applicable.'"

This statement of Mr. Detmold is untrue upon its very face. The "imperfections alluded to, we distinctly stated to be confined to the character of the formula "*within* those limits in which it is properly applicable." The allusion to the circumstance that the formula "does not designate the point at which it ceases to be applicable," was made, not to indicate a "defect" in the formula, but as an excuse, which every candid man will acknowledge a reasonable one, why in the haste in which the calculations were made, that limit should have been overlooked. It may be proper to remark here, that the errors alluded to by Mr. Detmold, were confined to the loads under the two lower velocities in the table—that they did not affect the accuracy of any conclusions which were drawn as to the expense of transportation, or as to the general principle of the operation of the locomotive engine upon railroads. I might, indeed, with

propriety, have spoken of that feature in the formula as a defect, which in fact it is; although, from the circumstances of the case, it might have been one which could not have been remedied, and for which no censure could justly attach to the individual who framed it. But I did not do this, I distinctly attributed the error to inadvertence, arising from the "haste" in which the letter was prepared; and I had supposed vainly, as it appears, that Mr. Detmold's sense of justice would have dictated a correction of his unjust imputations—or, that it would at least have prevented on his part any further allusion to an error which *he* did not detect, and which had been so promptly and fully corrected.

Mr. Detmold says: "As to the fact which Mr. Johnson states, that De Pambour, in his practical table (p. 186, Phila. Ed.), has been led into precisely the same error with himself and Mr. Talcott, *i. e.*, has applied his own formula beyond its proper limits," &c.

Upon this quotation from Mr. Detmold I will simply remark, that I have never stated that Mr. Talcott had been led into the error alluded to by Mr. Detmold, neither have I stated as unqualifiedly as Mr. Detmold asserts, that De Pambour had been led into precisely the same error—I did say, however, that it was "probable" that De Pambour had been led into, at least, one error from the same cause. The existence of this error, which Mr. Detmold's sagacity had not previously discovered, is of necessity admitted by him, and his attempt to explain it on different grounds is gratuitous on his part, and may, or may not, be true. If the error is equal to the last term in the formula quoted by Mr. Detmold, then he is probably correct in his explanation of the cause, but in either case, it has nothing to do with the main question at issue, which is, the accuracy of De Pambour's formula "*within* the limits in which it is properly applicable."

Mr. Detmold further states, "that he never charged Mr. Johnson with any intention of disparaging the labors of De Pambour." It is singular that this assertion should be so boldly and unblushingly made in the face of facts as glaring to the observation of all who have perused his communications, as the sun at noon-day. The very ground on which he seized the cudgel, to make battle with myself and Mr. Talcott, was to defend from disparagement the reputation and the labors of De Pambour, under the false impression, so far at least as I myself was concerned, that both had been intentionally and wrongfully assailed.

I will not dwell longer upon this part of the subject, but will proceed to consider that part of Mr. Detmold's communication, in which he endeavours to refute the positions taken by me, in illustrating some of the imperfections of De Pambour's formula "*within* the limits in which it is properly applicable."

Mr. Detmold says, that I have endeavoured to show that De Pambour has not made the proper corrections in the use of the spring-balance, "*because*, he takes into account only 1st, the pressure produced by the lever at the place of the valve; 2d, the pressure produced at the end of the lever by the weight of the rod, screw, and spring; 3d, the weight of the disc of the valve."

Mr. Detmold here again asserts what is untrue—I assigned no such "because" as he affirms under the first and third heads; for the error referred to in the correction of the spring-balance. It is, moreover, impossible, from the nature of the case, that I should have done so—my remarks referred exclusively to the correction which designates the

influence of the several parts of which the balance is composed. And Mr. Detmold has not demonstrated, neither has he adduced evidence of the probability that the view taken by me is incorrect.

Mr. Detmold next proceeds to comment upon the correction pointed out by me in respect to the atmospheric pressure upon the valve, resulting from the greater surface exposed to atmospheric than to steam pressure, in consequence of its conical shape. He says—"that the error alluded to can only exist when the valve is close to its seat, and then it can never be exactly ascertained, as in that case the spring-balance only indicates the pressure of the steam in a *negative* manner; for so long as the valve is perfectly closed, all that we know is, that the steam is of less force than the pressure of the spring-balance, added to that of the atmosphere. But the instant the valve is raised off its seat, in ever so slight a degree, we then know the pressure of the steam *positively*." There is here a pedantic display of scientific terms, without any just conception of the true sense in which they should be employed.

The spring-balance, when the valve "is perfectly close to its seat," instead of "indicating the pressure of the steam in a *negative* manner," affords no evidence, either *negative* or *positive*, that there is the least pressure exerted by the steam. So far from its indicating the pressure of the steam in any "manner" whatever, it affords, when in the condition mentioned, not the least evidence that there is any steam in the boiler!! That the pressure of the steam must exceed De Pambour's estimate, before the valve can be raised so as to permit an escape, Mr. Detmold is compelled to concede, and that it is not greater when the steam is making its escape, he has entirely failed to prove. The declaration of the contrary involves a gross absurdity. De Pambour, Sec. 4, chap. 2, illustrates the mode of estimating the pressure, on the rising of the valve, from the increased surface exposed, but he seems not to have been fully aware that the steam which passes through the most contracted part of the orifice is diffused over a greater space upon the valve; and also that the force of the steam, while making its escape, not only sustains the valve with the atmospheric pressure upon it, but overcomes in addition thereto the atmospheric pressure upon the orifice around the valve. De Pambour's view of the subject was evidently unsatisfactory to himself, for he states at the close of his remarks upon the subject, that "there still, however, remains the blowing of the valve, the *exact appreciation of which escapes all manner of calculation.*"

Mr. Detmold's assertion, that while the steam is blowing off, "the air (owing to its nature as a fluid) and the issuing steam meet upon the same point of the valve," is not true, in point of fact, and a little reflection will render manifest also the absurdity of this statement.

The declaration of Mr. Detmold, that "as in most locomotive engines the mitre is only one-fourth of an inch, the error resulting therefrom can at most be 3 lbs., or 4 per cent.," is like a previous statement, where he alludes to the mode of attaching the spring-balance "to all the engines he had ever seen," entirely foreign to the question at issue, and can at best but be viewed as an attempt at evasion.

In investigating the accuracy of De Pambour's analysis of his experiments, it is with the mode of construction and dimensions of the engines which *he* made use of that we have to do. The reasonableness and necessity of this position is so perfectly obvious, that any attempt to illustrate it might fairly be construed as an intentional insult to the understanding of the reader.

The information which De Pambour gives, as to the mitre of his valves, shows that the diameter of the two surfaces were as 2½ to 3 inches, and Mr. Detmold ought to have perceived that in the absence of further proof than is afforded by De Pambour's work, no other dimensions are admissable. There is, independent of this logical defect in Mr. Detmold's reasoning, an incongruity in his statement, since under a strict technical interpretation, when the mitre is one-fourth of an inch, the difference in the diameter of the two surfaces is one-half, instead of a quarter of an inch, as assumed by him.

Again, Mr. Detmold says, that "this error, however, could in no degree have affected the results of De Pambour's experiments, as in all cases he verified the pressure indicated by the spring-balance, by the mercurial gauge." Admitting that the mercurial gauge affords a correct measure of the pressure, how was this verification effected? The mercurial gauge was not attached to the engine, and could not be, when the latter was in motion. For all that portion of the time, therefore, during the movement of the engine, when there was no escape of steam from the valve, and the index of the balance remained unmoved, no evidence of the true pressure is afforded by the mercurial gauge, for the very plain reason that the pressure, as indicated by that instrument, is obtained *through the medium of the spring-balance;* and when the latter instrument fails to perform its duty, as in the case mentioned, the mercurial gauge becomes equally deficient, a circumstance which Mr. Detmold seems to have altogether overlooked.

Mr. Detmold says, further, that "Mr. Johnson rejects the use of that instrument (the mercurial gauge) in toto, because De Pambour says that the steam having to pass through a long and narrow tube, arrives on the mercury at a less degree of pressure than in the boiler." Mr. Detmold must have been sensible that this "because," in this, as in the preceding instance, is not in strict accordance with the truth. My reasons were based upon the fact that the spring-balance, with the corrections properly made according to the description of that instrument and the form of the valve as given by De Pambour, gave a degree of pressure a little exceeding that of the mercurial gauge, and hence must of necessity be nearer the truth. The remark of De Pambour was only alluded to as confirming results previously obtained, and was not stated as a "because." Upon this subject Mr. Detmold finding it to his interest to differ from De Pambour, does not hesitate to say, that "the pressure of the steam upon the mercury becomes *precisely* the same as in the boiler."

The impracticability of determining by the spring-balance, and consequently by the mercurial gauge, the exact pressure of the steam, so necessary in arriving at a correct experimental knowledge of the power of traction and evaporation of engines at different velocities and at given pressures, occasioned the suggestion by me of a cylindrical piston as a substitute for the conical valve.

In its construction and operation it is more simple than the manometer proposed by De Pambour, which obviates none of the defects of the conical valve, and as to its impracticability. if Mr. Detmold had observed the manner in which the graduation upon the scale of the balance is proposed to be effected, and had known how uniform is the friction or resistance when metallic packing is used, he would have observed that the friction was amply provided for, and would have hesitated not a little before he would have committed himself in so public, and positive a manner as to its success.

I now proceed to notice Mr. Detmold's comments upon that portion of my communication, which relates to the evaporating power of the engine. The remarks made by me upon this subject, and the conclusions to which I arrived, remain like the other positions unrefuted; but Mr. Detmold having exhausted his own resources, quotes largely from a recent edition of Mr. Wood, whose evidence so far as he has offered any thing *new* upon the subject, goes to support most fully all that I have advanced.

In my communication, I clearly proved that the evaporation or quantity "S," on which the relative power of the engine under different velocities mainly depends, instead of being invariable and constant, as assumed by De Pambour, at all velocities of the engine, possessed a different character. That it increased with an increase, and diminished with a diminution of the velocity, and that the variation amounted in one of the experiments from which the average value of "S" was derived, to twenty-nine per cent below, and in another to twenty-three per cent above that average, making a difference between these two extremes of fifty-two per cent!!!

I also showed that in the case of the first experiment with the Atlas engine, being the second of the experiments from which the average value of "S" is deduced, that the velocity corresponding to the maximum load as given by the formula, was at least twenty-nine per cent greater than the velocity attained in the experiment; yet Mr. Detmold having from a blind belief in the infallibility of De Pambour, committed himself in favor of the "sterling accuracy," and "close corroboration of theory by practice of his formula, as the most fastidious could require," obstinately persists in refusing to acknowledge his mistake, notwithstanding the evidence is so plain, that "he who runs may read."

Mr. Wood upon this subject says, that "as the subject of determining the relative evaporation at different rates of speed, *is of great importance* in the investigation of the power of these engines, we shall in our calculations of the useful results produced in practice, suppose the power of evaporation, constantly the same at all rates of speed, *until we have an opportunity of more conclusively determining the evaporation at different rates of speed!*"

Mr. Wood also says, in respect to the resistance presented by the escape of the steam from the cylinders, and the increased evaporation, "these two will, in *some degree*, balance each other." Mr. Detmold not appreciating the force of language, takes this to mean that they will either exactly, or so nearly balance each other, that no further investigation is desirable, or necessary.

Mr. Wood again says, that "*until therefore experiments are made to determine both these effects accurately at the different rates of speed required, to form a correct conclusion*, we shall, as before stated, assume the evaporation, etc. to be constant."

Mr. Wood, in the above quotation, clearly admits all that I affirmed in relation to the importance of further experiments to determine the evaporation, and the resistance of the escape steam, and he follows De Pambour in assuming the value of "S" to be constant at all velocities, for precisely the same reason, that it was so assumed by me in the construction of my table, viz: the want of experimental evidence, which De Pambour does not furnish, to show the amount of that evaporation, and resistance at different velocities.

How it could be possible for Mr. Detmold, with the "clear conceptions," which I have a right to suppose he claims for himself, from the

gentlemanly manner in which he charges me with the want of so essential a quality in philosophical investigations, should not have observed the very perfect coincidence of the views of Mr. Wood, so far as he ventured to give an opinion upon the case, with those advanced by me, I am at a loss to conjecture; and it is the more strange from the fact that the above quotations from Mr. Wood, are contained in the very paragraph which Mr. Detmold introduced from that author into his communication!

De Pambour made no experiments, if I recollect right, upon the resistance presented by the reaction or escape of the steam. His experiments also upon the evaporation were very meagre, comprising only eleven experiments, with six engines. Yet meagre as they were, I conclusively showed in my communication, that any formula based upon the supposition that the evaporation is constant, with no provision for the resistance of the escape steam, is imperfect.

Had Mr. Wood viewed the subject more attentively, in the light in which it has been presented in my own and Mr. Talcott's communication, I do not doubt he would have spoken still more decidedly of the importance of farther experiments, with a view of rendering De Pambour's formula still more perfect.

The facts stated by Mr. Talcott, that, applying "De Pambour's formula to all his experiments, when the engine was in good order, the regulator entirely open, and the load less than a maximum by the formula, the discrepancy between the results of the formula and the experiment, falls below ten per cent. of the load drawn only in about one-fourth of the whole number, and in about one-fifth is between ten and twenty per cent.; about one-fourth between twenty and forty per cent.; one-sixth between forty and one hundred per cent., and in the remainder (about one-half) the discrepancy is over one hundred per cent.!!

It certainly does not require a very acute mind to discover in the above facts sufficient evidence that the formula is to a certain extent imperfect; for let it be remembered, that the engines and the apparatus for determining the pressure, used in the experiments, were principally the same employed by De Pambour, in the experiments for determining the evaporating power; and as both were made by the same individual, the circumstances were extremely favorable to the successful application of the formula. I again repeat, that the fact of there being so great a discrepancy, is of itself *prima facie* evidence of the imperfection of the formula.

It completely confirms the justness of the conclusion to which I arrived in investigating the principles on which that formula was based; and I am fully sustained in the opinion which I advanced, and which gave so great offence to Mr. Detmold, that there are "defects in De Pambour's mode of conducting and analyzing his experiments," and that those "experiments *require to be extended and carefully revised.*" On this subject I would respectfully request that those of the readers of the Journal, who have not examined with attention my previous communication, should do so before forming an opinion, as there are some points of importance which Mr. Detmold has overlooked, and to which I have not time at present to refer. There are others, also, relating to the subject under discussion, which might be advanced, but which I have not at present the leisure, or the disposition to offer.

Correct as the position assumed by me is proved to be, it does not by any means follow that De Pambour is not deserving of the greatest credit for the very able and remarkably lucid manner in which he has treated

the subject of the Locomotive Engine. I have from the first accorded him all the credit which is undoubtedly justly his due; but to suppose that he has succeeded in presenting, as Mr. Detmold asserted, when he entered upon the controversy, a "strictly accurate formula," obtained by the most "rigorous deductions" "from established principles in mechanics," and "accurate and extensive experiments," and containing no "imperfections or deficiencies," in the face of the most positive and conclusive evidence to the contrary, I am not so strongly imbued with the feeling of manworship, or so servile a follower in the footsteps of others, as to be willing to acknowledge.

Mr. Detmold evidently commenced his attack upon myself and Mr. Talcott, under the influence of prejudices in favour of all that is European, which is more peculiarly the characteristic of those who have come to our shores from abroad. This feeling, or weakness, I could have overlooked. But when I find combined with it, a temper not the most amiable, impelling to remarks not the most gentlemanly, and a disposition to evade or misrepresent facts as they exist, I must be excused for the severity of some portion of my comments, and must decline any further notice of Mr. Detmold, unless by some flagrant action on his part, a future notice shall be deemed neccssary. E. F. JOHNSON.

Engineer's Report to the New-York and Albany Railroad Company.—E. F. JOHNSON, ESQ., Chief Engineer.

Continued from page 29.

Northern Division.—Report of R. P. Morgan.

OFFICE OF THE NEW YORK AND ALBANY RAILROAD CO.
January 7, 1839.

To E. F. Johnson, Esq., Chief Engineer N. Y. & A. R. R.

SIR:—I herewith present to you a brief statement of the result of the field operations in the Northern portion of the proposed route of the New York and Albany Railroad, during the last season. The whole period included between May and November, was employed in testing every route which might render this important line as perfect as possible.

In submitting the details of the operations of my party, it affords me much satisfaction to reflect that they exhibit not only facts which prove the unquestionable feasibility of the route, but will justly raise the character of the undertaking, in the public estimation, far beyond the most sanguine expectations that have been hitherto entertained. The various lines examined, equal in extent more than three times the distance contained between the extremes of the survey—and I am fully convinced that no important feature in the topography of the country has escaped notice. The remarkable valley which extends from the South line of Putnam County, entirely to Hillsdale, in Columbia County, offered facilities for the construction of a Railroad, greater than I had ever met with upon any survey in which I had been previously engaged.

In your own examination, you must also have been struck with the natural advantages arising from the peculiar and favorable formation of

the country, particularly in the direction of the ridge constituting the Highlands on the Hudson river parallel with the Taghkanic ridge, in which the line of the survey is situated, in a Northerly direction, whilst the valley continues, with great uniformity in its surface, and with a very moderate inclination, for sixty-two miles. The highest summit upon the line surveyed, is situated in the town of North East, and is fifty-two miles from the north line of West Chester county, the point of commencement of the survey. The elevation overcome in this distance is 511·40 feet, which, added to 257·92, the height of the point of commencement above tide, gives for the elevation of the summit above the same level 769.32 feet.

In proceeding to the northward, the line descends with slight undulations, only 100 feet in 16 miles, passing at the same time through a very favorable opening to the west side of the Highland ridge.

From the south-east part of the town of Clayerack, near Hoffman's, and about ten miles from Hudson, the line was continued northwardly, on the west side of the ridge, where the ground became more broken and difficult, but by no means as much so as had been anticipated. It was not necessary to increase the grades beyond 30 feet per mile, and the earth to be excavated was for the most part gravel. Nine miles beyond Hoffman's, in Claverack, the line intersects the Hudson and Berkshire Railroad, in Ghent, and continues on fine, smooth land, descending 25 feet per mile, to Kinderhook creek, near the village of Valatie. A high bridge of 100 feet span will be necessary for passing the stream—the expense of which will not be great, from the existence of rocky banks, which form natural abutments. Having crossed the stream, no further obstructions of a difficult character were encountered. We were enabled, in making a descent to the Hudson, to select the valley of Mitches' Kill, which descends gradually to the river, at Castleton, or to pursue a line, on the remarkable table land which lies between Kinderhook and Greenbush. A survey was made of both these routes; the descent upon neither exceeding the maximum inclination on the other portion of the line, of 30 feet per mile. The whole distance to the upper ferry at Bath, opposite Albany, is 98½ miles.

The survey was also extended 6·17miles further, to Troy, on comparatively level ground, near the margin of the river. In re-examining the ground, on my return south, I omitted no point, where improvement could be made, and in many instances there exists a choice of routes which are nearly equal. At the request of the inhabitants of Salisbury, in Connecticut, and in consideration of the immense amount of freight to be obtained in Iron and Marble from that region, a branch was surveyed, extending to that village. This line was found practicable, at a maximum grade of 35 feet per mile, descending to the south. A survey was also made from the main line in Dover, to Bull's bridge, in Kent, on the Housatonic river, (distance four miles) which was found practicable, for the construction of a branch.

Annexed is an estimate of the necessary excavation and embankment, masonry, bridges, &c., which, it is believed, will be found ample in every respect, having allowed, in addition to a liberal estimate upon the several items, 10 per cent for contingent expenses. The average cost for constructing the road bed, for a single track, from Putnam county, south line, to Albany, is $9.226 62 per mile, which may at first appear a small sum compared with the cost of other Railroads; but it should be remem-

bered that more than forty miles of this route is over smooth meadows, or table land, in which a small embankment of from one to two feet, will be amply sufficient for the road bed.

The inclination of the grade line no where exceeds 30 feet per mile, and for many miles there is a close approximation to a level. There is 65·32 miles of straight, and 32·50 miles of curved line. Few of these curves are less than 5000 feet radius, and there is one curve only, as small as 1200 feet radius. This occurs in turning a point of the mountain in Clavarack.

Your experience must at once impress you with the comparative excellence of the whole line, and I feel confident that you will join me in the opinion, that it is alike fortunate for the company, and the public, that so favorable a route has been found for connecting the cities of New York and Albany.

To my principal assistant, Mr. H. A. Gardner, and others employed in the execution of the surveys, I am much indebted for their zeal and attention in the discharge of the duties assigned them.

Respectfully submitted,

RICHARD P. MORGAN,

Resident Engineer.

Northern Division.—Estimate of Cost of Graduation.

Section, No. 1,

Extends north from Putnam county south line five miles.

Clearing and Grubbing Section,			$ 840 00
Excavation and haulage common earth, cubic yards,	224·135,	*a* 20 cts.	44,827 00
Do. do. Rock, cubic yards,	16·987.	*a* $1 00,	16,987 00
Masonry of Bridge across Croton river, cubic yards,	1·750.	*a* 4 00,	7,800 00
Superstructure do. linear feet,	150,	*a* 20 00,	3,000 00
Masonry in 7 culverts, cubic yards,	3,200,	*a* 1 12½,	3,600 00
Fencing, rods,	305,	*a* 3 00,	915 00
			$77,169 00

Section, No. 2,

Extends to Dover 19 miles.

Clearing and Grubbing Section,			$ 1,655 00
Excavation and haulage common earth, cubic yards,	221·850,	*a* 16 cts.	35,496 00
Do. do. Rock, cubic yards,	7·407,	*a* $1 00,	7,407 00
Masonry of two Bridges across Swamp River, cubic yards,	790,	*a* 4 00,	3,160 00
Superstructure do. linear feet,	100,	*a* 15 00,	1,500 00
Masonry of 6 culverts, cubic yards,	223,	*a* 3 00,	669 00
Fencing, rods,	12·160,	*a* 1 12½,	13,680 00
			$63,567 00

Section, No. 3,

Extends to the town of North East 22 miles.

Clearing and Grubbing Section.				$ 1,480 00
Excavation and haulage common earth, cubic yards,		766·250,	*a* 18 cts.	137,925 00
Do. do. Rock,	cubic yards,	6 622,	*a* $1 00,	6,622 00
Masonry of 3 Bridges,	" "	1,600,	*a* 4 00,	6,400 00
Superstructure 2 Bridges,	linear feet,	200,	*a* 20 00,	4,000 00
" 1 "	" "	50,	*a* 15 00,	750,00
Masonry 29 culverts,	cubic yards,	9·370,	*a* 3 00,	2,811 00
Masonry 1 culvert arched 6 feet span,		120,	*a* 3 50,	420 00
1 Road Bridge,				650 00
Fencing,	rods,	14·080,	*a* 1 12½,	15,840 00
				$176,898 00

Section, No. 4,

Extends to Hillsdale 16 miles.

Clearing and Grubbing Section,				$ 1,120 00
Excavation and haulage common earth, cubic yards		860·100,	*a* 17 cts.	146,217 00
Masonry 12 culverts,	do.	936,	*a* $3 00,	2,808 00
Do. 3 culverts arched 10 feet span,		1·237,	*a* 4 00,	4,948 00
4 Road Bridges,				2,825 00
Fencing,	rods,	10·240,	*a* 1 12½,	11,520 00
				$169,438 00

Section, No. 5,

Extends to Claverack Creek 9 miles.

Clearing and Grubbing Section,				$ 1,000 00
Excavation and haulage common earth, cubic yards,		404·650,	*a* 20 cts.	80,930 00
Do. do. Rock,	cubic yards,	15 000,	*a* $1 00,	15,000 00
Masonry 1 Bridge.		400,	*a* 4 00,	1,600 00
Superstructure 1 Bridge,	linear feet,	50,	*a* 15 00,	750 00
Masonry 9 culverts,	cubic yards,	472,	*a* 3 00,	1,416 00
Masonry 1 culvert arched 10 feet span,	do.	445,	*a* 4 00,	1,780 00
1 Road Bridge,				650 00
Fencing,	rods,	5,760,	*a* 1 12½,	6,480 00
				$109,606 00

Section, No. 6,

Extends to the Hudson and Berkshire Railroad 5 miles.

Clearing and Grubbing Section,				$ 900 00
Excavation and haulage common earth, cubic yards,		339·880,	*a* 15 cts.	50,982 00
Masonry 9 culverts,	cubic yards,	1·027,	*a* $3 00,	3,081 00
Masonry 2 culverts arched 6 feet span,	do.	474,	*a* 3 50,	1,659 00
1 Road Bridge,				2,000 00
Fencing,	rods,	3·200,	*a* 1 12½,	3,600 00
				$62,222 00

SECTION, No. 7,

Extends to Rensselaer county south line 10 miles.

Clearing and Grubbing Section.			$ 1,300 00
Excavation and haulage common earth, cubic yards,	305·380,	*a* 15 cts.	45,807 00
Masonry of Bridge across Kinderhook Creek, do.	2·009,	*a* $4 00,	8,036 00
Superstructure do. linear feet,	100,	*a* 20 00,	2,000 00
Masonry 5 culverts, cubic yards,	382,	*a* 3 00,	1,146 00
Masonry 1 culvert arched 10 feet span, do.	400,	*a* 4 00,	1,600 00
2 Road Bridges,			1,350 00
Fencing, rods,	6·400,	*a* 1 25,	8,000 00
			$69,239 00

SECTION No. 8,

Extends to Bath in the town of Greenbush 12·33 miles.

Clearing and Grubbing Section,			$ 1,900 00
Excavation and haulage common earth, cubic yards,	465·600,	*a* 15 cts.	69,840 00
Do. do. Rock, do.	7 000,	*a* $1 00,	7,000 00
Masonry 23 culverts,	1·610,	*a* 3 00,	4,830 00
Masonry 2 culverts arched 10 feet span,	do. 800,	*a* 4 00,	3,200 00
Fencing, rods,	789·100,	*a* 1 25,	9,867 00
			$96,637 00

RECAPITULATION OF SECTIONS.

Sections.	*Distance in Miles.*	*Amount.*
1.	5	$ 77,169 00
2.	19	63,567 00
3.	22	176,898 00
4.	16	169,438 00
5.	9	109,606 00
6.	5	62,222 00
7.	10	69,239 00
8.	12½	6,637 00
		$824,776 00
Add for superintendence and contingencies, 10 per cent.,		82,477 60
Total for Northern Division,		$907,253 60

Equal to $9,226 26 per mile.

Table of Grades

Commencing at Putnam county south line, and terminating in the town of Greenbush, opposite Albany.

No.	Length of Grade in Miles.	Distance from Harlaem in Miles.	Inclination of Grades per Mile. Ascent.	Descent	Level.	Height above Tide at termination of grade
1	4·75	47 13	29·82			399·563
2	1·17	48·28	23·00			426·463
3	9·08	57·38			Level	426 463
4	4·00	61·38		5·00		406·463
5	1 50	62·88	5·00			421·463
6	2·50	65·38		5.00		408·963
7	2·42	67·70	8·00			428·323
8	2 30	70·70		18·00		386·923
9	3,00	73·10	10·00			416 923
10	1.60	74·70			Level	416·923
11	4.50	79·20	30·00			551·923
12	2 55	81·75	18·00			597·823
13	1·30	83·05	5·00			604·323
14	1·50	84·55		10.00		589·323
15	5·00	89·55	30·00			739·323
16	2 50	92·05	11·00			769·323
17	2·44	94·49		25·00		715·643
18	1·56	96·05		30·00		668·843
19	4·34	100·34			Level	668·843
20	0·83	101·22	18·00			682·783
21	2·00	103·22		16·00		651·783
22	1·33	104·55	20·00			678·383
23	2·35	106·90		20 00		631·673
24	1·65	708·55	25·00			672·933
25	5 15	113·70		30·00		517·133
26	3·90	117 60		28·00		407·933
27	1 30	118·90			Level	407·933
28	1·80	120 70		30 00		353·933
29	2·15	122·85			Level	353·933
30	1·30	124·15		25·00		321·433
31	2 72	126 87	10·00			348·633
32	1·88	128·75		25·00		301·633
33	1·00	129·75			Level	301·633
34	3·00	132 75		18·00		247·633
35	2·90	135·65		20·00		189·633
36	5·06	140·71		30·00		36·333

Recapitulation of Grades.

19·47	miles.	Level.
18·94	"	Level to 10 feet per mile.
19·76	"	10 to 20 " "
8 44	"	20 to 25 " "
31·72	"	25 to 30 " "

Extent of curved line from 1200 to 6000 feet radius,	4·66	miles.
" " " 6000 and over	27·84	"
Total curvature,	32·50	"
Straight line,	65·83	"
Total distance Northern Division,	98 33	"

RECAPITULATION OF THE WHOLE LINE.

Estimate of Cost of Grading, &c. of the Southern Division, for a Road-bed 16 feet in width on embankments, and 8 feet added in excavations, for drainage, with 10 per cent. added for Superintendence and Contingencies, as per Mr. Shipman's Report,	$508,753 16
Do. do. do. Northern Division, as per Mr. Morgan's Report,	907,253 60
Total cost of Grading for whole line,	$1,416,006 76
Equal to $10,063 30 per mile.	

GRADES.

22·147	miles	Level
26·705	"	Level to 10 feet per mile
26 505	"	10 to 20 " "
10 088	"	20 to 25 " "
55·268	"	25 to 30 " "

LINEAR ARRANGEMENT.

Extent of curved line,	38·981	miles, equal to	28	per cent. of whole line
" straight "	101·732	" "	72	" " "
Total distance,	140·713			

WE present to our readers such portions of the Semi-Annual Report of the Water Commissioners as may be interesting to our professional readers. We have omitted the details of the various vexatious difficulties which have been encountered.

A very important question discussed in the report we have reserved for separate notice—we refer to the subject of crossing Harlem river. We conceive that very important interests are involved in the question, and we shall enter at large upon it in our next number.

Semi-Annual Report of the Water Commissioners, from the 1st of July to the 31st of December, 1838, inclusive.

To the Honorable the Common Council of the City of New-York:—

The Water Commissioners respectfully report: that they have deposited in the Comptroller's office, a semi-annual account current of their receipts

disbursements, from the 1st day of July, 1838, to the 31st of December thereafter. The sums total expended by them, from the commencement of the operations under the "Act to provide for supplying the City of New-York with pure and wholesome water," are as follows:

From July,	1835, to January,	1836,	$31,828 02
" January,	1836, to July,	1836,	12,070 84
" July,	1836, to January,	1837,	28,099 58
" January,	1837, to July,	1837,	62,602 85
" July,	1837, to January,	1838,	233,856 93
" January,	1838, to July,	1838,	605,766 76
" July,	1838, to January,	1839,	984 445 70
		Total,	$1,958,670 68
Add balance to the debit of Commissioners,			4,714 44
Grand total of requisitions on Comptroller,			$1,963,385 12

The following is a condensed view of the several objects for which the money has been expended; the details of which may be seen by a reference to the accounts in the Comptroller's office, referred to above:

1st. For land required for the aqueduct and reservoirs, and for rights of way and earth for embankments, - -	$54,842 08
2d. For work, &c. by contractors	904,052 64
3d. For salaries of Engineers, and incidental expenses of the corps	20,372 35
4th. For advertising, printing and stationery . . .	408 50
5th. For salaries of Commissioners and Clerk, and their incidental expenses	4,188 65
6th. For Chancery expenses, searches in the titles of land purchased, &c.	581 48
Total as above,	$984,445 70

The large amount disbursed during the last six months, is an evidence that the work has progressed in a manner indicating a desire on the part of the contractors, to bring it to a close within the time specified for its completion. Such an event will be gratifying to the Commissioners, and they have no doubt to the Corporation also. That the project will meet the anticipations of the public, when complete, both as to permanence, durability, and means of answering the puposes of its erection, there cannot be a doubt in the minds of any who have examined the structure, even thus far, in its progress.

We stated in our last semi-annual report, that a circular was issued by the Commissioners, on the 15th of May last, requesting proposals for furnishing the necessary amount of iron pipes that may be wanted for the syphons in crossing Harlem River and Manhattan Valley, and for uniting the receiving and distributing reservoirs. The proposals to be received until the 1st day of October, 1838. These circulars were extensively distributed both in this country and in England; and on the day appointed there were ten proposals received for furnishing the necessary castings, and from the following foundries:

FROM AMERICAN ESTABLISHMENTS.

1st. The West Point Foundry Association, by William Kemble.
2d. The West Troy Foundry, by Chollar & Jones,
3d. The Albany Dry Dock Foundry, by Mellen & Battel.
4th. The Albany Foundry, by William Many.
5th. The Baltimore Foundry, by John Baker.
6th. The Novelty Works, New-York, by Ward, Stillman & Co.
7th. The Foundry of Allaire, New-York, by James P. Allaire.

FROM FOREIGN ESTABLISHMENTS.

8th. By Boorman, Johnson & Co. as agents for a British house.
9th. By Hicks & Co. as agents for an extensive Foundry in England.
10th. By J. Comrill, as agent of Reid, Irving & Co. of London.

The bid of the West Point Foundry Association was a shade lower than any of those offered, and a contract was accordingly entered into with that Corporation, protected by adequate personal security for its due performance, based npon the following provisions:

1st. That the West Point Foundry will furnish the whole quantity of pipes required, whether more or less than that designated in the circular, and at the dates therein specified.

2d. That the weight of the pipes shall not exceed one hundred pounds over and above the estimated weight; such weight to be fixed and determined by the Chief Engineer.

3d. That for the curved pipes of twelve inches diameter that may be required, the Commissioners will pay for the making of the patterns.

4th. That ten per cent. is to be held by the Commissioners as a retainer, until the close of each year, when five per cent. of the ten will be paid contractors, retaining only five per cent. until the whole contract shall be completed.

5th. That security, amounting to $30,000, shall be given, to be approved by the Commissioners.

The Commissioners issued a card on the 7th of September, soliciting proposals to be received until the 23d of October following, for constructing and furnishing the materials for that portion of the aqueduct on the Island of New-York, comprising sections 86 to 97 inclusive, part of the fourth division, and embracing the bridge to support the iron pipes across Harlem river, the work to support the pipes across Manhattan Valley, the bridge over Clendining Valley, the receiving reservoir at 86th street, and the distributing reservoir at Murray Hill.

There was a favorable competition for the work, and it has been taken by the persons named below, at what is considered fair prices.

PART OF THE FOURTH DIVISION.

Section 86.	Ellsworth, Mix & Co, for syphon bridge, estimated amount	$360,000
" 87.	The same contractors	39,655
" 88.	Rutter and Carmichael	60,096
" 89.	The same Contractors	68,893
" 90.	Sears & Bigham	58,170
" 91.	Robert Pettigrew, for crossing Manhattan Valley	142,195
" 92.	Francis Blair	80,205
" 93.	Clark & Christie	40,886
" 94.	Bishop & Campbell, for crossing Clendining Valley	297,980

Section 95.	Byron & Bierd	$35,017
" 96.	Clark, Stone & Co. for receiving reservoir . .	565,748
" 97.	Thomson Price and Son, for distributing reservoir	360,710

This completes the contracts for the whole line of work under the superintendence of the Commissioners. The distance from the source, at the Croton River, to the distributing reservoir at 42d street, Murray Hill, is about forty-one miles. The longest time allowed the contractors, in which to complete their work, is to 1841; and, counting on the progress made during the last season, provided we are not restrained in our operations, we have strong hopes that the whole work will be completed at the limited period, and accordingly the agency of the Commissioners cease.

On the 15th of October several of those owning land required for the aqueduct, petitioned the Chancellor to instruct the Appraisers to estimate the damage to their property, both probable as well as apparent. He accordingly passed an order or decree, to the following effect, viz.: "It is declared and adjudged to be the duty of the Appraisers, and they are hereby accordingly empowered, to ascertain and report the amount of compensation to be paid by the Water Commissioners to the owners of land required to be taken in fee, or for temporary use, as the case may be, for the purposes intended by the Act; and with that view the Appraisers are to examine the property so required to be taken, and to estimate the value thereof, and appraise the damage the owner will sustain, by, and in consequence of the taking of the required property in fee, or for temporary uses as aforesaid, so far as such damage can, with reasonable certainty, be ascertained and appraised." This order, or decree of the Chancellor, is entirely new, and differs, in words at least, from that under which the former Appraisers acted. It has proved embarrassing to the Appraisers, and perhaps will be very expensive to the public.

The Commissioners were in hopes of being enabled to lay before your Honorable Body, the amount to be paid for the land required for the aqueduct, in the 12th ward of the city; but the Appraisers had not completed their awards in time for this report. The enormous damages claimed by some of the owners, the pains taken to prove them, and the hearing of Counsel employed for the purpose, has been the means of much and unnecessary delay and procrastination, in bringing this business to a close. A good portion of the embarrassment results from a necessary interference with the supposed grade of some of the streets and avenues, by the course of the aqueduct: and to remedy which, as the Commissioners are informed, it is the intention of the Committee on "*Roads and Canals*," to recommend to the Common Council an application to the Legislature for authority to take, by Commissioners, a piece of ground for a public square, where the greatest difficulty occurs. In the mean time, the commissioners are experiencing serious embarrassment by the delay in not being put in possession of the required land. They suppose that, *here*, in the county where the principal benefit was to be derived, all these perplexing difficulties would cease. The appointment of the Appraisers was made on the 19th of July, as before stated; and, presuming upon the operations of those previously appointed to act on the land required in the County of Westchester, that the time necessary for making up a report in the present case would not greatly exceed that consumed in the former, the Commissioners allowed from the 19th of July to the 7th of September; on which day they issued their notice to contractors, allowing to the 23d

of October for the delivery of proposals for contract; which gave rising three months for completing the awards, and for carrying the report through the necessary forms of the Court; instead of which, five months have elapsed, and the business is yet unsettled. The sections, in the mean time, have been placed under contract—the contractors anxious to proceed in fulfilling the stipulations of their several agreements, and we are compelled to refuse them permission, the land required still being out of the possession of the Corporation; and how long this state of the matter is to last, cannot be conjectured, under the embarrassing circumstances in which the Appraisers are placed.

The uncommon drought which prevailed in many parts of the United States, during the last summer, will be remembered for many years hereafter. That section of the County of Putnam and Westchester, through which the Croton River passes, has felt the effects of the dry season full equal, if not exceeding, any other part of this State; and the river was, consequently, remarkably low. In order to test the flow of the stream, under these unfavorable circumstances, and to compare it with an unusual dry time in 1835, Horatio Allen, Esq., our principal Assistant Engineer, made a gauge of the running water, on the 16th of August last, at two different stations on the stream. At the first station there was found running 26,386,560 gallons, and at the second station 28,738,000 every twenty-four hours; averaging 27,584,780 gallons. This quantity, with the present population of the city, is nearly three times as much as will be required for its use. It may be within the memory of some of the members of the Common Council that, on the 5th of September, 1833, Major Douglass made a gauge of the river, and found running every twenty-four hours 51,522,486 gallons; and that Albert Stein, Esq., also gauged the river on the 25th of the same month, when there was running 50,077,044 gallons per diem. These gauges were not taken when the water was at its least or greatest flow, but at a medium, and may therefore be considered as a fair average of what may be depended on, as there are seasons when several hundred millions of gallons pass through the Croton to the Hudson River daily. It is estimated also, that the Croton Reservoir will contain about one hundred millions of gallons to each foot in depth from the surface. The dam may be drawn down five or six feet, say five hundred millions of gallons; and in addition to this, we have 158 millions of gallons in the receiving reservoir and 19 millions in the distributing reservoir; making a total of 177 millions of gallons, exclusive of the running water, and what may be drawn from the Croton Reservoir; providing a surplus, in cases of drought, sufficient for any emergency, either probable or possible.

The dry season, however, has been favorable to the progress of the work, and we have no reason to be dissatisfied with the quantity or execution of that which has been performed. The mason work was discontinued on the first of November, and the work secured from the effects of frost during the winter. On the 15th all the Inspectors were discharged except four, who were retained for the purpose of overseeing the laying of dry foundation wall; the progress of which may be continued, without injury, through the winter. The rodmen and axemen have also been discharged; which reduces the Engineer Corps to twenty persons, instead of thirty-six, the number employed during the summer.

In our last report, we presented a brief statement of the most prominent operations on the line of aqueduct, and we now adopt the same mode, for the purpose of conveying to the public, through the medium of your

Honorable Body, similar information; comprising the length of aqueduct complete, the extent of tunnel excavations, the number and capacity of culverts erected, and other information of a similar character.

The Commissioners had proceeded thus far with their report, waiting the required information from the Resident Engineers on the several divisions, for a statement of the progress of the work; but the Chief Engineer has saved them the labor of collating the various items, and has drawn up and arranged the necessary information, in a form that will perhaps be more acceptable to your Honorable Body than the restricted plan adopted by the Commissioners; and they therefore annex the report of the Chief Engineer, in his own words and figures, as follows:

"It has been thought expedient to make a small increase in the breadth of the foundation walls, which is the only variation from the plan that our experience has thus far indicated as desirable; and it is believed the plan of work, in the main, will give the stability and permanence which its importance demands; and has, at the same time, all the economy that is attainable consistent with these essential requisites. The principal items of work done, have been ascertained by the Resident Engineer to amount as hereafter set forth, under their respective heads.

Aqueduct.

The masonry, and mostly the back-filling over the same, has been completed for the aggregate length of 59,169 feet, or 11¼ miles.

Side walls of aqueduct are prepared to receive the brick-facing and arches for the aggregate length of 1,443 feet.

Culverts.

A tabular statement, giving the detail of culverts, is herewith annexed, from which the following summary has been made:

Completed.

39	of	1½	feet	diameter, aggregate length	= 2,012	feet.
8	"	2	"	"	= 488	"
5	"	3	"	"	= 353	"
13	"	4	"	"	= 1,139	"
10	"	6	"	"	= 1,040	"
2	"	8	"	"	= 223	"
1	"	10	"	"	= 80	"
1	"	14	"	farm road viaduct	= 141	"
Total 79				Total length	= 5,476	"

Culverts in progress.

4	of	1½	feet	diameter, aggregate length	= 192	feet.
1	"	3	"	"	= 92	"
1	"	4	"	"	= 52	"
2	"	25	"	"	= 262	"
2	"	20	"	public roads	= 54	"
Total 10				the total length	= 652	"

Ventilators.

3 Ventilators completed.
5 " in progress.

Waste Weirs.

1 Waste Weir completed.

Tunnels.

Completed through rock 1 of 166 feet in length.
" " 1 " 333 "
" " 1 " 168 "

3 667 = total length.

Tunnels in *progress.*

	Perforated.	Length of Masonry laid.
1 in earth	98 feet	72 feet
1 in earth	12 feet	
1 in earth and rock	130 feet	
1 in rock	37 feet	
1 in rock	440 feet	
1 in rock	270 feet	
1 in rock	200 feet	
	1187	72

Total length of tunnel perforated = 1,854 feet.
" " " masonry laid = 739 "

Foundation and Protection Walls.

A tabular statement of the height of the several pieces of foundation wall is herewith annexed, which exhibits the height to which the work has been carried, and the total height required for wall and back filling.

Summary of principal items of work done.

Excavation—Earth 891,200 yards
" Rock 127,157

Total earth and rock 1,018,357 cubic yards.

Embankment 105,637 cubic yards.
Back filling 333.137 "

Total embankment and back filling 438,774 cubic yards.

Foundation wall 58,439 cubic yards.
Protection wall 36,590 "

Total dry wall 95,029 cubic yards.

Hydraulic masonry in aqueduct 102,294 cubic yards
Hydraulic masonry in culverts, &c. 13,116 "
Total hydraulic masonry 115,410 cubic yards.

There were at work on the line of aqueduct on the

25th July	3,451 men.
25th August	3,848 "
25th September	3,850 "
25th October	3,070 "
25th November	2,178 "
24th December	2,399 "

The extension of the contracts on the 4th division has been, in part, the cause of the increase in the number of men employed since the 25th of November.

An impression prevails very generally among the contractors, that the demand for men on public works next season, will exceed the supply, and consequently raise the price. This induces them to carry forward, as much as practicable, during the winter, that part of the work which admits of being done at this season, and this accounts for the continuance after the suspension of masonry, of so large a force on the line.

The work now doing consists of a small amount of masonry in the tunnels. The excavation, (mostly in deep cuts and rock,) foundation and protection walls; quarrying, dressing and delivering stone. Should the remaining part of the winter be as favorable as it has thus far been, it may be expected that the force on the line will not fall much, if any, below 2,000 men.

There have been four sections completed, and six others have their masonry completed, with the exception of a small amount that will require to be overhauled, to remedy some imperfections in the workmanship. The computations for these sections have been made out, and together with other developements, go to confirm the opinion, that the estimate of 27th December last, will be found sufficient for the accomplishment of the work.

Respectfully submitted.

JOHN B. JERVIS,

Chief Engineer N. Y. Water Works."

The result of the foregoing communication is as follows:

1st. AQUEDUCT. The whole length of aqueduct arched and complete, is 59,169 feet, or 11⅕ miles. That completed on the 1st of July last was about *two* miles. The increase, in this part of the work, since our last report, is 9⅕ of miles of aqueduct complete.

2d. SIDE WALL. The length of side wall, ready to receive the arch, exclusive of that already arched, is 1,443 feet.

3d. CULVERTS. There are 79 culverts completed and in use. Their aggregate length is 5,476 feet. The number completed at our last report was *twenty-two*, and their length 1825. *Increase*, 57 culverts. The number now partly finished is ten, and their length in feet 652. The number partly finished at our last report was *seven*; length 578. *Increase* 3 culverts in progress.

TUNNELS. The number of tunnels excavated throughout is three. Their aggregate length 667 feet. There are, besides, seven tunnels partly finished, measuring 1,187 feet of excavation; making an aggregate of tunnelling of 1,854 feet. The number complete at our last report was *three*, and the length 670 feet; together with *five* partly finished, measuring 610 feet in length; making a total of 1,280 feet. Increase in this description of the work 574 feet of tunnelling.

FOUNDATION AND PROTECTION WALL. The foundation wall laid is 58,439 cubic yards, and of protection wall 36,590; making a total of 95,029 cubic yards. The quantity of foundation wall, laid at our last report, was 28,000 cubic yards, and of protection wall 13,160; making a total of 41,160 cubic yards. Increase since our report in July last, 53,869 cubic yards.

This is a very limited sketch of the amount of work performed as a

whole, and is only intended to convey some idea of the structure and its progress. The immense labor in penetrating high hills, and in crossing deep valleys, can only be judged of by a personal view of the vast amount of labor performed hy the physical strength of man.

All which is respectfully submitted.

STEPHEN ALLEN,
CHARLES DUSENBERRY,
THOMAS T. WOODRUFF,
SAUL ALLEY,
WILLIAM W. FOX,
} *Water Commissioners.*

Office of the Water Commissioners, December 31, 1838.

Report upon the Finances and Internal Improvements of the State of New-York, 1838

IN our previous numbers, we have devoted much space to the subject of Internal Improvements in our own State.

Reference has been, and is continually made, to the following valuable report, and as we conceive a more lucid explanation of our State resources cannot elsewhere be found, we give it for the information of our readers. The precise nature and condition of our financial affairs relating to this most important subject, are herein fully set forth, and well merit our attentive perusal. This matter is, moreover, of general importance, and other States may receive profit from it as well as our own.

STATE OF NEW-YORK.

On the 12th of March, 1838, MR. SAMUEL B. RUGGLES, Chairman of the Committee of Ways and Means, of the Assembly of the State of New-York, submitted to the House the following Report on the United States Deposit Fund, and on the recommendation of the Comptroller to levy a direct tax.

MR. RUGGLES, from the standing committee of ways and means, to whom were referred so much of the annual message of his Excellency the Governor, as relates to the surplus revenues of the United States deposited with this State, and also the annual report of the Comptroller, upon the finances, begs leave, in respect to that portion of the message, and also in respect to that portion of the Comptroller's report which recommends the imposition of a direct tax, to submit the following REPORT:

That under the Act of Congress, passed June 23, 1836, which directed the surplus moneys in the treasury ol the United States, beyond the amount of five millions, to be deposited with the several States, the sum of $3,974,520 71 has been paid over to this State, being three-fourths of the moneys which it was entitled to receive under that law. By virtue of the subsequent act of Congress, passed October 2, 1837, which directed the transfer of the remaining fourth to be postponed until the first day of January, 1839, the residue of those moneys, amounting to $1,338,000, has hitherto been withheld; and whether it will be paid at the time spe-

cified in that act, may for the present be regarded as doubtful. Serious differences of opinion have prevailed in respect to the expediency of thus depositing this surplus revenue with the States; and if the sentiments of those who believe it more politic for the federal government to retain it, shall happen to prevail, the fourth instalment may possibly be permanently withheld from this State.

It is not, however, reasonably to be anticipated, that the money already received will be withdrawn. The act of June 23, 1836, which directed the deposite to be made, declared that when the money, or any part of it, "should be wanted by the Secretary of the Treasury of the United States" to meet appropriations by law, it should be called for upon certain notice mentioned in the act; but the subsequent law of October 2, 1837, provided that the amount thus deposited should remain with the States, "until otherwise directed by Congress."

It cannot be deemed probable, that a majority of the States represented in the National Congress, will direct the withdrawal of these moneys. Whatever may have been the literal provisions of the law, directing these moneys to be "deposited" with the States, the intention of those who passed it evidently was to secure a permanent distribution, and not a temporary loan of the surplus revenues. In fact the doctrine on that subject, as it was first advanced by President Jackson himself, plainly contemplated an irrevocable appropriation. In his message to Congress, in 1829, he declared that "the most safe, just, and federal disposition which could be made of the surplus revenue, would be its apportionment among the several States, according to their ratio of representation:"—and in the message of the subsequent year, he removed all doubts as to his intention in that respect, by stating, that in his prior message, he had felt it to be his duty "to recommend the adoption of some plan for the *distribution* of the surplus funds among the States, in proportion to the number of their representatives, to be applied by them for objects of internal improvement."

The sentiments thus promulgated at Washington, were distinctly responded to and adopted by the Governor of this State, in his annual message to the Legislature, in the year 1830; in which, after speaking of the funds to be derived from the surplus revenue, as "applicable to the extension of our public works," he says that "there can be no valid objection to the distribution of the surplus revenue among the States, to be disposed of at their discretion." The same chief magistrate, in the succeeding year, 1831, after stating that one of his most distinguished predecessors (Governor Clinton,) had alluded to the same subject in his message in 1827, renewed the suggestion contained in his former communication; and pressed it earnestly upon the consideration of the Legislature. A committee of the Senate in the same year, reported that in their judgment, the proposed distribution was "a matter of the first importance;" and for the reason, among others, that it would enable the State, in prosecuting her works of internal improvement, "to satisfy the just claims of all her citizens." The committee fully concur in the soundness of the opinions thus expressed, in respect to the distribution of these moneys; and in their judgment, the receipt by this State, of the large sum of $3,974,520 71 thus allotted to it, whatever may be the opinions of those who doubt the expediency of the measure, ought to be a subject of unmixed congratulation.

Without pretending to question the obligation of this State to repay the money thus deposited, whenever it shall be legally demanded by an act of

Congress, it may, nevertheless, be assumed that no reasonable probability exists that it will ever be thus demanded. Of the several States which have received their respective portions, amounting in the aggregate to nearly forty millions of dollars, the greater number have already appropriated it to objects of a permanent nature, from which it cannot be withdrawn without serious injury and inconvenience. Many of the States have expended it in works of internal improvement, or in paying debts previously incurred for that purpose. In some instances it has been loaned to their citizens; while one example, at least, is presented, in which it has been actually distributed, numerically, among all the inhabitants of the State. In nearly all these instances, the repayment of the money, if called for by Congress, will become inconvenient and oppressive to the people of those States, and can only be made by incurring a debt or imposing burthensome taxes Under these circumstances, therefore, it may be safely predicted, that a majority of the representatives of the States and of the people in Congress, will hesitate long before they consent to withdraw from the States the moneys thus distributed; but on the contrary, that they will prefer (in case it should be found necessary) to replenish the treasury by temporary loans in anticipation of the revenue.

The committee, therefore, wholly dissent from the opinion expressed by the joint committee of the last Legislature, upon the subject of this deposite fund, that the pecuniary means which it has furnished to the State, should be regarded as merely "temporary," and that the period of repayment is "not far remote." On the contrary, they are well satisfied, that the sum of $3,974,520 71 thus acquired, will never be withdrawn; and they recommend, that in all measures of legislation, it should be treated as a portion of the permanent property of the State.

The amount so received, has been loaned under the law of the last session, upon mortgage, to the citizens of this State, and yields a nett annual income of about $250,000; and the question then arises—How shall that income be appropriated?

It may be used in either of three modes. First, in defraying the ordinary expenses of supporting the government; or, secondly, in paying the interest on debts created, or to be created, for works of internal improvement; or, thirdly, in providing for public instruction, and the diffusion of knowledge.

It is not the province, or the intention of the committee, to estimate the comparative merits of these important objects. The duty of providing adequately for the education of the people, and that of furnishing the means of cheap and easy intercourse between the different sections of the State, are equally pressing and imperative. If the Legislature should be satisfied, however, that the State possesses other resources for prosecuting, with vigor and effect, all its necessary works of internal improvement, no question need arise as to the propriety of appropriating the whole of this sum, (large as it may be deemed,) to the gratifying office of diffusing more widely the blessings of education. But before such an appropriation shall be permanently made, it ought to be distinctly understood, that the other means of the State are, and will continue to be, entirely sufficient to satisfy the claims of that large portion of its population, whose welfare is depending upon the proper extension of its works of internal improvement. The original intention of the State, in procuring the distribution of the surplus revenues, evidently was to apply its portion "to the extension of our public works;" and until it shall be satisfactorily ascertained, that this great duty may be otherwise adequately discharged, it may well

be doubted whether these funds ought to be wholly appropriated to any other object, however meritorious.

It is believed that an attentive examination of the pecuniary resources of the State will satisfactorily demonstrate its ability to prosecute and extend its system of public works on the most liberal scale, without resorting for aid to the fund in question: and the investigation of this point has occupied the anxious attention of the committee.

This inquiry necessarily embraces not only the present, but also the future fiscal condition of the State, as its aspect may be varied from time to time by the progress of the public works. The want of a definite and well digested system, by which to prosecute our measures of internal improvement in regular and proper succession, increases the difficulty of accurately estimating the future condition of the treasuary. The movements of the State, for the last few years at least, have been irregular and disconnected, yielding only to occasional impulses, and proceeding without much plan or method. A struggle for some time has been going on between the friends of a vigorous system of internal improvements, and those who deny its expediency or safety: and our legislation has fluctuated according to the prevalence of one or the other of these contending opinions. It is not necessary or desirable to enter at this time into the particulars of this controversy, and it is alluded to only to explain the difficulty which it occasions in predicting, with that precision which could be desired, the future movements of our fiscal system.

In order to comprehend truly the present situation of our finances, and correctly to estimate our future progress, it will be useful to revert to the condition of the treasury when the canal policy was commenced.

Our financial history, during the last twenty years, is indeed replete with instruction. Within that eventful period we behold the origin, progress, and final success of those great measures of internal improvement, which have overcome not only the barriers of nature, but the more formidable obstacles of prejudice, incredulity, and error, and which are destined, in the latter respect at least, to achieve victories yet more signal.

No fact in all that history is more striking than the remarkable failure of our distinguished men adequately to estimate the pecuniary value of the canals. The most sanguine anticipations of the most enthusiastic supporters of our policy of internal improvement, fell far short of the actual results which that policy has produced; while the doubts and forebodings of its opponents, are remembered only as curious portions of our intellectual history. The State itself seemed wholly unconscious of its latent strength. In the present plenitude of our success, the fact is hardly credible, and yet the documents of the day testify, that before commencing the canals, the Legislature by a deliberate act, directed commissioners to solicit pecuniary donations in aid of the enterprise, not only from Connecticut and Vermont, but even from the States, then in their infancy, beyond the Alleghanies: and so far was this timid and discreditable policy pursued, that the very preamble to the law of 1817, which finally directed the canals to be commenced, took care to express the humble hope, that the States interested in the work, "would contribute their full proportion of the expense."

The torrent of ridicule and obloquy which the canals encountered, during the first few years of their progress, as well as the more solemn doubts of some of our ablest statesmen, will long be remembered. Without adverting to names less distinguished, it needs but to state the memorable fact that Mr. Jefferson pronounced the undertaking utterly visionary

and chimerical, and that it was "at least a century in advance of the age." Nor did the more decided friends of the canals appreciate in any just degree, their pecuniary value. In the year 1821, four years after they had been commenced, the Comptroller of the State, in obedience to a resolution of the Legislature, prepared an estimate of their respective revenues, in which he stated, that for the ten years next succeeding their completion, the tolls would amount annually to one hundred and fifty thousand dollars! The amount which was actually received during that period of ten years, exceeded ten millions of dollars. Among the names truly illustrious in the early history of our public works, few are more distinguished than that of Gouverneur Morris. His comprehensive intellect and ardent temperament, enabled him to look far beyond most of his contemporaries into the rapidly expanding future; and yet even he fell short of the realities which the Erie canal has brought within our view. In the singularly eloquent and animated memorial by which his fame is forever connected with that great work, and in which he endeavoured to enforce upon the Legislature the importance in all future time of connecting the Hudson with the western waters, after depicting the wide spread region around our inland seas, and its capacity to supply the means of a great and profitable commerce, he asked whether he could be deemed extravagant to predict that the canal within twenty years, "would annually bring down 250,000 tons?" The actual amount which reached the tide in 1836, was 697,347 tons, or nearly three fold the quantity estimated by Mr. Morris; and the total tonnage of that year, ascending and descending, exceeded thirteen hundred thousand tons.

The tolls of the canals in 1824, one year before their completion, were $340,000. In the next year, they reached $566,000, and rose in 1826 to $762,000. With the rapid progress thus strikingly exhibited, few of our citizens were inclined to believe that the canals had impoverished the treasury, or that they would prove in any way injurious to the pecuniary interests of the State. The subject was, however, presented to the public in the year 1827 in a new and unexpected light. In that year, the canal committee of the Senate, of which Mr. Silas Wright, jr., was chairman, introduced into that body a report, made avowedly for the purpose of drawing the attention of the public to the effect which the construction of the canals had produced upon the finances of the State, and of generally diffusing among our citizens a knowledge of the real situation of the public funds. It announced that "*an alarming change* had taken place in the public funds"—that the school fund was annually "charging the State with a debt of $15,000"—that the literature fund was "no longer able to answer the calls which the interests of education required should be made upon it"—that the actual income of the canals was "highly exaggerated in the public opinion"—that their gross receipts for the year 1826, without any deduction for expenses, were but $752,000, and paid an interest of only $6\frac{3}{16}$ per cent. on their total cost—that the debt of the State for the canals then made or making "would more probably be enlarged than lessened at the end of the year"—that "so long as it thus continued to increase, its final payment *was not even approaching*"—that "unless assisted by auxiliary funds, the canals would not pay their own interest and expenses, and redeem their debt within any reasonable time, *if they would ever do it*"—that "the debt, with the whole aid of those funds, could not be paid off in *a great number of years* yet to come"—and finally, that any appropriations by the State for the purpose of constructing other works, unless they should be more productive than the Erie and

Champlain canals, would "hasten the period when direct taxation must be resorted to."

The feeling of despondency which this celebrated document produced among the friends of internal improvement, not only in this State, but throughout the Union, is well recollected: and yet it is somewhat surprising, that an intelligent and sagacious people, should have permitted themselves for a moment to be misled by the financial view which the report professed to take. Its fallacy was obvious—consisting in the total omission to take into the account, the prospective, but certain and inevitable increase in the growth of the country, and the trade of the canals, and in assuming the receipts of 1826 as an immutable basis. It is needless to add, that the friends of internal improvement made a resolute, though ineffectual, struggle against the doctrines and tendencies of this report. The late Governor Clinton, on the assembling of the Legislature in the year 1828 laboured earnestly in his annual message to disabuse the public mind. He declared that "the condition of the finances had been greatly discoloured and misunderstood by inaccurate views and partial examinations"—that "fallacious statements had been mingled with the subject"—that "the constant and progressive increase of the canal revenue, and the correspondent diminution of the debt, would in a few years produce its total extinguishment"—that "the elaborate and systematic attempts to depreciate the utility and arrest the progress of internal improvements, were equally astonishing and mortifying"—that "the means of the State were ample, her resources great, and her credit equal to any emergency," and he renewed, "in the most earnest manner, his recommendations in favor of the leading objects which he had presented in his former communicatons."

The death of this great man in February of that year, withdrew from the cause of internal improvement its ablest champion, and the loss has been severely felt by the people of this State.

The predictions of his last message, as to the progressive increase of the tolls, and the extinguishment of the debt, have been fully realized. The annual tolls, which in 1826 were $672,167, (or according to the statement of Mr. Wright about $752,000,) amounted in 1833, to $1,542,695, although the rates had previously been reduced nearly 20 per cent.; and in the year 1835, to $1,485,775, although again reduced about 15 per cent.

On the 1st day of July, 1836, the tolls had accumulated in the hands of the commissioners to an amount sufficient (with the aid of the auxiliary funds previously realized from the salt and auction duties) to extinguish the whole of the outstanding debt. Previously to that time, upwards of four millions of dollars had been paid in cash directly to the public creditors; and the residue, amounting to between three and four millions, was then invested in temporary loans by the Commissioners, as trustees for the holders of the balance of the debt.

This final consummation may justly be regarded as the crowning event in the canal policy of the State, and fixes an important epoch in its fiscal history. It affords, moreover, an opportunity peculiarly fitting, not only to review the progress of our treasury since the commencement of our canals, but also to examine how far the view of the finances taken by the committee of the Senate, in the report of 1827, has been borne out by the facts.

In the year 1817, when the canals were commenced, the funds of this State consisted of,

1. Productive property in bank stocks, mortgages and other claims, amounting to		$4,779,302 70
The State then owed a debt of		1,503,685 00
Leaving a balance of		$3,275,617 70
Of these claims a portion was subsequently discovered to be worthless to the amount of		302,000 00
Leaving, ...		$2,973,617 70
The annual income of this balance was about	$180,000 00	
The State derived a revenue from auction duties of	191,123 38	
and from salt duties imposed in that year and paying in 1818, ...	48,784 27	
Making the total revenue . .	$419,907 65	

2. Unproductive property in lands and public buildings; the former containing about a million of acres. From the sales of these lands a fund had been previously established for public instruction, called the "Common School Fund," the principal of which, on the 1st January, 1817, amounted to $982,242 26

The constitution of 1821, transferred to this fund all the lands then remaining unsold, with some unimportant exceptions.

Another special fund had also been established principally for the support of academies, called the "Literature Fund," the principal of which, on the 1st of January, 1817, amounted to $26,696 10

By an act passed in 1826, the amount of $233,616 19 was taken from the $2,973,617 70 above mentioned, and transferred to the Common School and Literature Funds, leaving $2,740,001 51

To contradistinguish this amount of $2,740,001 51 from the two special funds above mentioned, it was designated in the public accounts as the "General Fund."

When the canals were commenced in 1817, another special fund was created for the security of the public creditors of whom money should be borrowed for the construction of the canals, designated as the "Canal Fund," and consisting of the salt and auction duties above mentioned, the tolls to be received from the canals when constructed, and some other items of minor amount.

The establishment of this latter fund consequently diverted from the ordinary uses of the treasury, the salt and auction duties, amounting to $239,907, and reduced the nett income of the State from $419,907 65, as above stated, to about $180,000 annually.

A tax had previously been laid on the whole property of the State, to defray the expenses of the war, which had recently terminated. That tax was continued at a reduced rate, until the year 1826, and was applied, together with the annual income of $180,000 above mentioned, to the payment of the ordinary expenses of the government.

In 1826, the rapid increase in the canal tolls began to exhibit itself as

is above stated, and the State tax was then discontinued, upon the ground that the principal of the remaining balance of $2,740,001 51, would sustain the government until the debt for which the salt and auction duties and canal tolls were pledged should be extinguished, and that those revenues would then be liberated and placed at the service of the State.

Between that time and the year 1836, the whole of that balance was accordingly expended, principally in defraying the ordinary expenses of the government, amounting to $2,740,001 51
and the State also borrowed the bank safety fund, amounting to 416,532 43

Making in all, ... $3,156,533 94

Of this amount, a portion exceeding $500,000 was expended in erecting the State Hall and the State Prisons.

The aggregate amount of the salt and auction duties which were received, between the years 1817 and 1836, by the Commissioners of the Canal Fund, and paid over to public creditors, and which, if they had not been so applied, would have been used during that time for the ordinary purposes of the government, exceeds $5,000,000; so that although the above sum of $3,156,533 94 was thus expended, the salt and auction duties remain to the amount of the $5,000,000 virtually invested in the canals, and stand as a substitute for the $3,156,533 94.

In the year 1832, in order to extinguish a claim of John Jacob Astor, to lands in Putnam county, sold by the State, and the title to which had proved defective, a debt was created, called the Astor stock, to the amount of $561,000.

Since the year 1825, the State has also created debts in constructing lateral canals, which remain outstanding, viz:

For the Oswego canal, ...	$421,304
Cayuga and Seneca, ...	237,000
Chemung, ...	316,000
Crooked Lake, ...	120,000
Chenango, ...	2,270,000
	$3,364,304
And it has commenced the construction of the Black River canal, and the Genessee valley canal, and created debts on those accounts, for	190 920
Making the total existing debt for lateral canals,	$3,555,224

Between the years 1817 and 1837, the Common School Fund was increased from $982,242 26 to $1,916,647 68, and the Literature Fund from $26,696 10 to $268,092 87.

On the first of January, 1837, the productive property of the State, consisted of the canals:—which produced a nett revenue in the year 1836, (after deducting all expenses of collection, and of maintenance and repairs,) of $1,107,871 30; equivalent to an annual income at 5 per cent. on a principal of $22,157,742

The debts of the State now are:

To the Bank Fund, . . .	$416,532	
The Astor debt, . . .	561,000	
For the lateral canals, . . .	3,555,224	
		$4,532,756

Which deducted from the productive property as above, leaves a balance of	$17,624,986

The income of the State may then be estimated as follows:

Nett revenue from the canals as above,		$1,107,871 30
The revenue of 1836 is assumed in this estimate, for the reason that the tolls of 1837 were reduced by accidental and temporary causes.		
The auction duties, which produced in 1837,		214,458 62
The salt duties do		111,516 89
Total,		$1,413,846 81
Brought forward, ...		$1,413,846 81
From which deduct interest on debt of $4,532,756 65,		226,662 83
There remains, ...		$1,187,183 98
The ordinary expenses of the government are estimated at		400,000 00
Leaving a clear annual surplus revenue of . .		$787,183 98

It thus appears, that in the twenty years from 1817 to 1837, the productive property of the State was increased from $2,973,617 to $22,157,742, (or after deducting the debt, $17,624,986); the annual revenue, from $419,907 to $1,413,846; that during the same period, $500,000 was expended upon the public buildings; that the school and literature funds were doubled; the State tax discontinued, and the people relieved from burden or expense in supporting the government.

It would naturally be supposed, that the signal success which has attended the prosecution of our canal policy, would have removed all opposition to the extension of a system which has produced such prosperous and profitable results; and yet there are still to be found within this State, individuals of respectability and influence who zealously maintain that the treasury has been impoverished and exhausted by our public works: that the extension of the system will impose grievous and everlasting burthens upon the people:—and that "internal improvement," (in the often repeated phrase of a distinguished advocate of these opinions,) "is but another name for eternal taxation." Upon what ground this strange doctrine rests, it is not easy to discover. The State, within the last twenty years has quadrupled its productive property, relieved its citizens from taxation, and now enjoys a clear annual revenue of nearly eight hundred thousand dollars: and how, under these circumstances, its treasury can be regarded as impoverished or exhausted, is wholly beyond the comprehension of the committee. The supporters of this doctrine, however, allege that the "General Fund" is squandered, and gone;—that the State has no other fund to which it can legally resort;—and therefore, that the treasury is exhausted, and taxation has become necessary. But neither of these propositions is founded in fact. The General Fund is neither squandered nor gone, but now exists, in full vigour, invested in the canals, and in that shape yields an ample revenue to the treasury. and it is no more lost than the seed is lost, which, when sown, produces an abundant harvest. The treasury, in fact, is overflowing with the tolls derived from the canals: and to those tolls the State may now legally and properly resort, for the purpose, not only of meeting all its present obligations, but of extending the benefits of internal improvement to those hitherto neglected portions of its

population, at whose common risk, and upon whose common credit, the canals were constructed.

But it has been contended, that these revenues are placed "wholly beyond the reach" of the representatives of the people; and upon the ground that the tenth clause of the seventh section of the Constitution of 1821, has declared that the tolls shall not be "reduced or diverted" at any time before the "full and complete payment" of the moneys borrowed for the construction of the Erie and Champlain canals; and it is averred, that in point of fact, those moneys have not been fully and completely paid, according to the literal requirements of that clause.

This objection, it will be perceived, if well founded, will apply equally to the reduction, as to the diversion of the tolls; and as it involves in both respects important consequences, it deserves attention.

The Convention which framed the amended constitution, assembled in 1821, and only a few months after the Comptroller had estimated that the tolls of the canals for the ten years next after their completion, would be only one hundred and fifty thousand dollars annually. From peculiar causes, not necessary now to state, a large majority of that body participated in the doubts and forebodings as to the eventual success of the canals, which then prevailed with a considerable party throughout the State; and there is good reason to believe that many of its leading members honestly feared, that the debt to be incurred in constructing those works would never be paid; and that if the tolls should be reduced or diverted, a perpetual tax to pay the interest would be imposed upon the people. It was mainly under the influence of this apprehension, and far less, if at all, for the purpose of affording a specific pledge to the public creditor, that the clause in question was inserted in the constitution.

[To be continued.]

Hydrographical Survey of the Lakes.

The late disasters on the Lake Erie coast, will not, we hope, prove a fruitless warning of the deficiency of government over the interests of commerce on our inland seas. At least a dozen vessels have gone ashore there, since the first of November; in almost every case the calamity would have been avoided had there been charts in existence, and the ordinary precautions taken. Our whole lake coast from Ontario to Superior is unknown to hydrography, and demands national care more than any other part of the country. Its claims to protection, on the score of public importance, cannot be estimated too highly.

The aid given to the lake navigation by the government, has not been commensurate to its value; long before the United States rose to their present elevation, the English had delineated and explored the shores, and sounded the depth of waters contiguous to the Canadas. A nautical survey would save annually hundreds of thousands of property, and occasionally many lives. It should be made as soon as possible, as a mere question of national economy, to say nothing of the annual loss of shipping and merchandize constantly recurring. In the months of October and November, the loss of the underwriters and owners could not have been less than $300,000. This one item for two months, shows, if not the constant rate of loss, the constant liabilities to loss, and by consc-

quence the perpetual tax upon all trade, in the shape of increased freight and insurances. This subject demands the immediate attention of Congress, and we hope it will be promptly attended to.

It is astonishing that on lakes so much frequented, and so liable to shipwrecks, there are neither charts or sailing directions—to the strange mariner, the *eye*, assisted by judgment and discretion, is the only guide which can direct the master in the responsibility attached to the command of a vessel, with the valuable lives confided to his care and protection.

Innumerable facts can be adduced showing the great want of the maritime survey; a few, we trust, will be found interesting. Not having the official returns at hand for 1837, we will take those of 1836, for the ports of Buffalo and Chicago, the harbors at the extremities of Erie and Michigan. From the port of Buffalo there were 3,712 clearances and the same number of entrances, the tonnage of which was 642,000 tons. The lowest estimate of the passengers going to the westward alone for that year was 108,000, by many it was computed at double that number. Chicago, it should be recollected, was in 1836, just coming into existence; in that year there were 450 arrivals, (viz. 49 steamers, 10 ships and barques, 26 brigs, 363 schooners, and 8 sloops, averaging 87,550 tons. We have mentioned those two ports, conceiving that our lake commerce is not generally known, or its extent and importance as yet duly appreciated abroad. Cleaveland and Detroit both equal, if they do not exceed, Buffalo, in the number of vessels and the amount of tonnage.

By a maritime survey, we shall acquire accurate charts, the exact location and character of all reefs, shoals, rocks and islands, and an acquaintance with the currents and tides (if any), also, a full description of landmarks, and all dangers to which the shipping are now exposed. The latitude and longitude of all places would be established by astronomical and chronometric observations, the magnetic variations and dips, &c., and a mass of scientific knowledge would be gained highly creditable to the nation. It is evident that a hydrographical survey of the lakes, would be of great advantage to the country, for in the destruction of property by disasters, government must suffer as well as individuals.—*Buffalo Patriot.—Communicated.*

Improvements of the Microscope.—A German, named Van Esten, has recently produced an improved microscope, of astonishing and unheard of powers. They are made of diamonds crystalized after being dissolved, and they have enabled him to make most astonishing discoveries in the properties of bodies, some of them having an intimate connexion with health and the treatment of diseases. This animalculæ which forms the poisonous matter of certain diseases, are made distinctly visible by means of this microscope, and some of these are in the same manner to make part of some articles of our ordinary food. It has often been conjectured by medical men, that the *virus* of many disorders to which the human body is liable, has an animalcular origin, and this supposition has been fully verified by the observations through Van Esten's microscope. Those substances are found to be composed almost entirely of animalculæ, and these seem to be as various in their powers, habits and modes of life, as the large animals which inhabit the earth. The animalculæ of the varioloid virus differ from these of the small-pox virus in size rather than form and habits. A new theory and mode of treatment for diseases is likely to be the result of those discoveries. Spellanzani long since

observed that the pediculous was in the habit of scratching itself and thence inferred that it was bit by some other animal. This most minute animal is now made visible. If the means of destroying the animalculæ that constitute the virus of diseases shall be found out, a vast addition is made to the means of prevention and cure of disease. No doubt the means of destroying them *in ovo* will be discovered, not only in the human frame, but in the food that we eat, from which they originate.—*Miss. Intelligencer.*

Mammoth Steam Ship.—A friend has sent us the dimensions of an Iron Steam Ship, now building in England, to run from Falmouth to Calcutta, which voyage, it is expected, will be performed in thirty days.

"The Queen of the East," which is the name of the vessel, is to measure 2617 tons—her engines are to be of 600 horse power, with cylinder of 84 inches diameter, and 9 feet stroke. Her draft of water, at the greatest immersion, 15 feet. Dimensions—Extreme length, 310 feet; length of main deck, 282 feet; length between perpendiculars, 270 feet; length of principal cabin, 128 feet; width of beam, 45 feet; depth of hold, 30 feet. There will be 16 private rooms for passengers, and 400 berths.

There is now running an iron steamboat, between London and Antwerp, the Rainbow. She has performed the distance between Blackwall, her point of departure, and the quay at Antwerp, in 16 hours and 50 minutes. Her engines are of 180 horse power, 50 inches cylinder, and 4½ feet stroke. Her dimensions are as follows: tonnage, 580; length of deck, 198 feet; length between perpendiculars, 190 feet; breadth of beam, 25 feet; depth of hold, 12 feet 8 inches.

While Europe is thus making rapid strides in Ocean steam vessels—is America, the land of the invention of such vessels, to remain forever supine? Are Government and merchants alike indifferent or inattentive to the progress making elsewhere in this new arm of maritime superiority, an arm alike potent for commerce and for war? It would really seem that we, as a nation, had no interest in this new application of steam power, or no energy to appropriate it to [illegible] use. We hope this apathy may not last too long.—*N. Y. Americ[illegible]*

Syracuse and Utica Railroad.—It will [illegible] the travelling public great pleasure to learn from the Journal of Commerce, that the work on this road has proceeded with activity during the past season, and is now in a state of such progress that the whole line will be ready for the iron by the middle of May. The directors have made such arrangements as they expect will insure the seasonable arrival of the iron, in which event the road will be open for travel early in July next. They have entered into an agreement with the Utica and Schenectada Railroad company for the use of their cars and engines, which, as soon as the road is completed will run from Schenectada to Syracuse. This arrangement is mutually beneficial to the two companies, and must be very satisfactory to the public, as it in effect brings the two roads into one, from Schenectada to Syracuse. —*Buffalo Patriot.*

Canajoharie and Catskill Railroad.—It is stated in the Catskill Messenger, that twenty-six miles of this road are finished, and will be opened in the spring. The length of the road, when completed, will be seventy miles, at an average cost of about $3,571 per mile.